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ABSTRACT

This study was designed to measure the performance of academically underprepared students who complete remediation, compared with underprepared students who do not complete remediation. The study was conducted on 766 full-time students at Ivy Tech State College, a two-year technical institution in Indiana. All of the students included were academically deficient in reading, writing and/or mathematics based on ASSET scores. Two hypotheses were tested: (1) academically underprepared students who complete remedial courses achieve greater academic success in college than underprepared students who do not complete remediation; and (2) underprepared students who complete remediation persist longer towards educational goals than underprepared students who do not complete remediation. Results showed that students who completed remediation earned higher grades in college-level English and math courses and earned higher cumulative grade point averages than those who did not complete remediation. Students who completed all remediation earned more credit hours than students who completed some remediation. In turn, students who completed some remediation earned more credits than students who completed no remediation. Both hypotheses were supported by the data presented in this dissertation. Contains 57 references and 9 tables. (RDG)

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Lyn Ann Batzer

ENTITLED The Effect of Remedial Education Programs on Academic Achievement and Persistence at the Two-Year Community College

AS PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF Doctor of Education

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THE EFFECT OF REMEDIAL EDUCATION PROGRAMS ON ACADEMIC ACHIEVEMENT AND PERSISTENCE AT THE TWO-YEAR COMMUNITY COLLEGE

Lyn Ann Batzer, Ed.D.

Western Michigan University, 1997

Community colleges are open door institutions that serve students who may lack the basic skills necessary to succeed in college. The number of academically underprepared students attending community colleges has been increasing over the years. Thus, there is a corresponding need for effective remedial programs to prepare the academically underprepared students for college-level work.

The purpose of this study was to examine the effectiveness of remedial education. More specifically, the study was designed to measure the performance of academically underprepared students who complete required remediation compared to academically underprepared students who do not complete remediation.

The study tested two hypotheses: first, that academically underprepared students who complete remediation achieve greater academic success in college-level courses than academically underprepared students who do not complete remediation; and second, that academically underprepared students who complete remediation persist longer towards their educational goals than academically underprepared students who do not complete remediation.

The population for this study included 766 full-time, associate degree-seeking students at Ivy Tech State College, a two-year technical college in Indiana. All 766 students were identified as being deficient in reading, writing, and/or mathematics based on ASSET scores.

Regarding academic achievement, results showed that academically underprepared students who completed remediation earned higher grades in college-level English and college-level math than those who did not complete remediation. Likewise, students who completed all remediation earned higher cumulative grade point averages than those who completed some or none of the remediation as indicated by ASSET scores. Concerning persistence, results showed that students who completed all remediation earned more accumulated credit hours than those who completed some remediation. Likewise, those who completed some remediation earned more accumulated credit hours than those who completed no remediation.

These findings supported the hypotheses that academically underprepared students who complete remediation achieve greater academic success and persist longer towards their educational goals than academically underprepared students who do not complete remediation.

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THE EFFECT OF REMEDIAL EDUCATION PROGRAMS ON ACADEMIC ACHIEVEMENT AND PERSISTENCE AT THE TWO-YEAR COMMUNITY COLLEGE

by

Lyn Ann Batzer

A Dissertation
Submitted to the
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Lyn Ann Batzer

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CHAPTER I

INTRODUCTION

Purpose of Study

Community colleges are open door institutions that serve students who may lack the basic skills necessary to succeed in college. The number of these academically underprepared students attending community colleges has increased over the past several decades (U.S. Department of Education, 1991). Thus, there is a corresponding need for effective remedial programs to prepare the academically underprepared students for college-level work.

The purpose of this study was to examine the effectiveness of remedial education programs within the context of the community colleges' open door policy. More specifically, the study was designed to measure the performance of academically underprepared students who complete required remediation compared to academically underprepared students who do not complete required remediation. The remedial education effectiveness measurement variables were student persistence toward achieving educational goals and student academic achievement (grades in college-level math and English as well as cumulative grade point average).

An important element of the study was the concept of open door, meaning that all citizens are welcome to become community college students regardless of academic preparation or other characteristics such as age, race, or gender. Community colleges traditionally do not limit enrollment to those capable of

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completing college work, but rather provide an open door to higher education for all students (Roueche & Roueche, 1993). Typically, the community college student is older, less academically prepared, less economically secure, more likely to be female, and more likely to be a minority than students attending four-year universities (Cross, 1981). Additionally, community college students often bring many complicating life factors to the classroom, including job and family responsibilities. Within the open door context, this study focused on the students' deficient academic preparedness, specifically lack of basic skills in reading, writing, and math. How well have community colleges served these academically underprepared students to help them achieve their educational goals?

Significance of the Study

Community colleges are enrolling increasing numbers of academically underprepared students, according to the United States Department of Education (1991). By necessity, remedial programs have been established to help prepare students for college-level work. Ninety-one percent of all community colleges offer remedial courses and programs (Knopp, 1995). In 1994, the American Association of Community Colleges established success in subsequent, related coursework and student persistence as the core indicators to measure the effectiveness of developmental education. Yet, a survey completed by the U.S. Department of Education (1991) indicated that only 15% of the community colleges ranked success in subsequent courses as being a first priority in evaluating remedial programs. Henry (1986) stated, "In general, colleges have failed to adequately document the effectiveness of special developmental and remedial educational programs. This must be remedied" (p. 46).

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The problem of community colleges neglecting to follow-up with remedial students is compounded by the fact that relatively little research has been completed evaluating remedial programs. While some studies have evaluated the effectiveness of remedial programs, most have merely described the demographic characteristics of underprepared students. Additional research appears necessary in order to provide information regarding the efficacy of remedial programs. This information is important to remedial students, remedial instructors, counselors, and administrators.

Remedial students have much to gain from such information. If remedial courses in reading, writing, and math have a direct effect on their future success in college-level courses and retention, the underprepared students' chances of obtaining an advanced education would be enhanced by completing remediation. The students also would be able to justify their investment in cost, time, and effort if they knew there would be a greater possibility of achieving their academic goals as a result of completing remedial courses.

Remedial instructors have traditionally measured the success of their remedial courses by administering pre- and posttests to determine if the students have increased their skill levels during the remedial course. However, a more pertinent evaluation might be whether the students can move into the academic mainstream and be successfully integrated into college-level courses (Clowes, 1984; Tinto, 1982). Information regarding students' success in follow-up courses would be valuable for remedial faculty as they evaluate their instructional methods and continually strive to improve their students' academic achievement.

Counselors and faculty advisors need information regarding the effectiveness of remedial courses as they advise students in course selection. Although remedial

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courses are mandatory in many community colleges, underprepared students must often be convinced of the need for such courses. Students frequently provide excuses about why they should not take remedial reading, writing, or math classes. In some instances, counselors or faculty advisors provide waivers for students, thus allowing underprepared students to enter college-level courses (Hyde, 1992). Reliable information may enable counselors and faculty advisors to more effectively advise students about the value of remedial courses and, subsequently, increase the number of students enrolling in these courses.

Community college administrators are responsible for maintaining the open door in order to provide equal educational opportunity in their communities. At the same time, they are responsible for maintaining high standards and quality in academic programs. Therefore, administrators must know if developmental programs and courses are adequately preparing students to enter the academic mainstream of college-level courses.

Additionally, administrators need quantitative data in order to make budgetary decisions, particularly during times of decreasing resources. Opinions are frequently voiced regarding whether community colleges should be responsible for remediating basic skills (Colby & Opp, 1987; Lively, 1995b; Manno, 1995). Administrators must be able to respond with factual data.

Thus, the significance of this study is to add to the body of knowledge regarding the effectiveness of remedial courses. The information could help remedial students, instructors, counselors, faculty advisors, and administrators be more effective in the educational process.

Guiding Questions

This study was designed to add to the body of knowledge regarding the effect remedial education programs have on student academic achievement (as indicated by grade point average and grades in college-level English and math) and persistence toward achieving educational goals as students move into the community college mainstream curriculum. For purposes of this study, "community college" refers to all two-year community, technical, and junior colleges.

The following questions provide the structure for the study:

1. Do academically underprepared students who complete required remedial education courses achieve greater success in college-level courses (i.e., college-level English, college-level math, and overall academic achievement) than academically underprepared students who do not complete required remedial courses?

2. Do academically underprepared students who complete required remedial education courses persist longer than academically underprepared students who do not complete required remedial education courses?

CHAPTER II

CONTEXT OF THE STUDY

The purpose of this study was to examine the relationship between remedial education courses and academic achievement as determined by student persistence towards educational goals (accumulated credit hours) and academic achievement (cumulative grade point average and grades in math and English). The two guiding questions for this study asked whether underprepared students who complete remediation have greater academic achievement and persist longer towards their educational goals than academically underprepared students who do not complete remediation.

The literature was reviewed to identify the context in which this study was conducted. Questions related to the context and discussed in this chapter include:

1. What is the background of remedial education in the United States? What is the role of the open door community college in delivering remedial education?

2. How is remedial education defined in the literature? What theories exist that support the need for and provide the conceptual framework in which remedial education is delivered?

3. How is the academically underprepared student described?

4. What methods have typically been used to evaluate remedial education courses? Are these methods effective? What other methods could be used?

5. What studies have been completed regarding the effectiveness of remedial education pertaining to increased retention and academic achievement?

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6. Within the described context, is there a need for this study?

Remedial Education in Retrospect

Background of Remedial Education

The need for remedial education can be traced back over 150 years. Remedial studies were offered at Yale University in 1828 for students with "defective preparation" (Pintozzi, 1987). The first documented remedial program began in 1849 at the University of Wisconsin with course offerings in reading, writing, and mathematics. The remedial department was abolished in 1880, at least in part, because of the university's embarrassment caused by their students' need for such remediation (Wyatt, 1992). Despite perceived embarrassment, remedial courses emerged over the next 20 years at such prestigious institutions as Cornell, Harvard, Wellesley, and the University of California at Berkeley (Boylan, Bingham, & Cockman, 1988; Brier, 1984).

By the turn of the century, 84% of all colleges and universities had some form of remedial course work (Abraham, 1992). By 1928, William Book at the University of Indiana "began to laud rather than condemn the practice of assisting underprepared students" (Wyatt, 1992, p. 12). He began a "How to Study" course in addition to developmental reading courses in response to the dilemma that one half of all University of Indiana students had not met course requirements.

Passage of the Higher Education Act of 1965 enabled greater numbers of educationally disadvantaged, minorities, and women attend to college. The need for remedial education grew. Declining academic skills continued into the 1970s. The Educational Testing Service established a blue ribbon panel to determine why SAT

scores were declining (Anderson, 1980). The panel attributed declining skills to four primary reasons in the secondary schools: (1) reduced emphasis on reading, (2) diminished seriousness of purpose and attention to mastery, (3) the influence and distraction of television viewing, and (4) the declining role of the family.

This discussion continued into the next decade. The 1980s brought increased involvement from commissions, agencies, foundations, and task forces. The National Commission on Excellence in Education wrote a report entitled *A Nation at Risk* (1984), which outlined the problems in the educational system:

> The educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people. . . . We recommend that schools, colleges, and universities adopt more rigorous and measurable standards and higher expectations for academic performance and student conduct. (p. 5)

Clearly, the report was a mandate for change. However, change did not occur, and basic skills continued to decline. In 1988, the Commission on the Future of Community Colleges (1988) prepared a report clearly stating their position on the role of the community college in the face of declining basic skills:

> We recommend that reading, writing, and computational ability of all first-time community college students be carefully assessed when they enroll. Those not well prepared should be placed in an intensive developmental educational program. Community colleges must make a commitment, without apology, to help students overcome academic deficiencies and acquire the skills they need to become effective, independent learners. (p. 17)

A survey conducted by the National Center for Educational Statistics (1991) revealed that by 1989, three out of four colleges (both two- and four-year) offered at least one remedial course. Thirty percent of all college freshmen in the United States (675,000 students) were enrolled in one or more remedial classes. At institutions with a predominantly minority student body, 55% of the freshmen took at least one

remedial course. At institutions with a predominantly nonminority student body, 27% of the freshmen took at least one remedial course.

Recent statistics from the American Council on Education (Knopp, 1995) revealed that 1.6 million students were enrolled in at least one remedial course in 1992 and that 91% of all two-year colleges and 84% of all four-year institutions offered remedial courses. The 1.6 million students included both older students returning to school to further their education and recent high school graduates. Understandably, the returning adults may have needed to brush up on basic skills due to a time lapse between their last academic endeavor and the present. There was an expectation, however, that recent high school graduates would possess the basic skills necessary to enter college-level courses without remediation. Nevertheless, many high school graduates had chosen less challenging courses in high school and, consequently, were not ready for college-level work (Parnell, 1985). Paul and Orcutt (1994) conducted a study for the Lilly Foundation in Indiana entitled "High Hopes/Long Odds," which surveyed high school students regarding their present high school course work and their future plans. Results showed that although 90% of the high school seniors surveyed planned to attend college, only 50% of the students were enrolled in courses to prepare them adequately for college-level work.

In response to the growing number of students needing basic skills review, the number of remedial educational programs and courses is growing. Along with this growth is a continuing debate regarding who should deliver remedial education. Lively (1995b) stated, "Politicians don't like paying twice for students to take high school mathematics and reading, and students are frustrated by having to repeat high school work" (p. A28). Manno (1995) described remedial education as the "race for the bottom" (p. 48) and claimed that with such a race educators do three things

First, they incur a huge cost for the taxpayer; second, they devalue the worth of a college degree; and third, they send a message to young people that hard work in high school doesn't matter because almost anyone can be admitted to college. Platt (1986) provided a rebuttal to these arguments against remedial education by stating that remedial education serves adults, many of whom were unmotivated high school students who have now realized the importance of an education. It then becomes a moral question: If colleges do not offer remedial education, what is the alternative for these underprepared students?

In summary, remedial education is not new. However, it is not clear whether remedial education is achieving its goal of preparing students for the college-level academic programs. This lack of information regarding the effectiveness of remedial education supports the need for this study's guiding questions. First, do academically underprepared students achieve more academically, and, second, do they persist longer than their counterparts who do not complete remediation?

The Role of the Community College in Delivering Remedial Education

Since their inception, community colleges have had an open door policy. This means that all students are welcome regardless of academic preparation, socioeconomic status, gender, race, age, or other demographic characteristics. The open door policy was designed to ensure that all citizens have an equal opportunity to obtain an education (Roueche & Roueche, 1993). Thornton (1966), in his description of the junior college, stated that schools are the "social elevators in a hardening social structure" (p. 62). He continued by saying that education is the vehicle by which individuals can achieve personal and social advancement. The community college provides higher education opportunities for citizens who would

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otherwise be unable to attend college because of academic unpreparedness, financial limitations, family/job responsibilities, or geographic location restrictions (American Association of Community and Junior Colleges, 1987).

While the community colleges' open door policy has provided educational opportunity for the people, too often the "open" door has become a "revolving" door, because underprepared students do not have the skills to complete college-level work. Thus, if the community college is to maintain an open door policy, there is an implied intent to deliver remedial education programs to ensure students' success. Only then can the goal of educational opportunity for all citizens be attained.

For the purposes of this study, the focus was on remedial education programs offered in the community college.

Characteristics of Remedial College Students

The academically underprepared student entering the community college today represents quite a diverse population. In its 1990 report, *Serving Underprepared Students*, the League for Innovation in the Community College indicated that there is wide diversity within the category of "high risk" students entering the community college today. Recent high school graduates, returning adults, high school dropouts, and students with limited English proficiency are among the students who need remedial education. Breneman and Nelson (1981) describe the community college student as "more likely to be older, part-time, working, and less well-prepared" (p. 22). Cage (1992) describes the community college student as:

> more likely to include greater numbers of returning women, minorities, and foreign-born students than would the university class. The older the group of students, the more likely that family-support responsibilities will exacerbate the difficulties in balancing work and school commitments. Community college freshmen typically work 20 to 30 hours per week and are

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> in tight economic situations, where frequently decisions between work and academic responsibilities result in decreased numbers of hours available for study. They are critically insecure economically; it is estimated that one-third of community college students live below the poverty line. (p. A30)

Roueche and Roueche (1993) appeared to agree with Cage (1992) and Breneman and Nelson (1981). They presented a comparison of characteristics describing two-year and four-year university freshmen. Table 1 presents Roueche and Roueche's comparison. Notable are the differences in family and mentoring support, self-image, goal orientation, job responsibilities, age, ethnicity, socioeconomic status, academic preparation, and high school preparation.

A recent study conducted by the American Council on Education (1995) examined the characteristics of students who took remedial courses. Findings included:

1. The majority of students enrolled in remedial classes were freshmen and most attend public two-year colleges.
2. More than half were women.
3. Nearly three in five were 24 years of age or under.
4. More than one third were minorities.
5. Approximately one half were financially independent, with the majority earning less than $20,000 per year.
6. More than one third received financial aid.
7. Less than one half were enrolled full-time.
8. Approximately one fifth were not U.S. natives.
9. More than one half had composite SAT scores of 800 or less.

These findings by the American Council on Education suggested that remedial education is utilized by students with varying characteristics. Knopp (1995) stated,

Table 1

Entering Freshmen

4-YEAR UNIVERSITY	2-YEAR COMMUNITY COLLEGE
Family expectations/support	First-generation learners/little support
Connectability/mentor	Pathways to success unknown
Strong self-concept & image	Poor self-image
Have a "worldview"/traveled	Have not left neighborhood
Success experience/goal-oriented	Failure/self-defeatism/unreachable goals
Adversity-free/low work levels	Work 30 hours per week/social ills
Age range 19–22	Average age 28
Youthful women/recent high school graduates	Returning women
Majority student population	Large minority student population
Small percentage of foreign-born students	Increasing numbers of foreign-born students
Economic security: $70K	Economic insecurity: one-third students below poverty level
Competitive/motivated	Desperation/economically driven
Academically talented	Academically weak
High school GPA 3 6+/top 10%	Top 99 percent of high school graduating class
SAT = 1100	Poor or low test scores/GED

Data Source: Roueche & Roueche, 1993

"Contrary to stereotypes, the majority of undergraduates taking developmental courses are white students whose primary language is English and who were born in the United States" (p. 1). Regardless of the students' characteristics, though, they all face the challenge of entering college with deficient academic skills.

Cross (1974) compared the differences between the academically prepared and academically unprepared students with strong and weak swimmers. She stated:

> The picture is not unlike that of a strong and a weak swimmer thrown into downstream currents above a waterfall. The strong swimmer soon swims to calm waters and begins to focus attention on how fast he can swim, while the weak swimmer is dragged into such swift currents that his only concern is to keep himself from going over the waterfall. (p. 22)

Remedial Education Programs

Description and Goals

The diversity of the remedial student population, as described above, is important to the discussion of remedial education programs, for as Roueche and Roueche (1993) stated, "The variety and magnitude of academic, social, and economic circumstances makes the remedial student more likely to succumb to failure in future academic pursuits" (p. 41).

Remedial education programs are designed to serve this diverse, academically underprepared student population entering the community college. In most community colleges, the students' basic skill level is determined with an assessment instrument designed to measure ability in reading, writing, and mathematics (U.S. Department of Education, 1991). Based on test results, students are identified as either academically prepared (nonremedial) or academically underprepared (remedial). Nonremedial students may enroll directly in college-level courses, while

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remedial students need to complete reading, writing, and/or mathematics courses prior to enrolling in college-level courses. Remedial course completion is either required or recommended, depending on the community college.

Knopp (1995) conducted a survey which found that 91% of all community colleges offer remedial education programs. Another survey conducted by the National Center for Educational Statistics (1991) revealed some common characteristics among the remedial programs. The majority (a) do not have a separate remedial division, but rather remediate within the academic programs; (b) offer institutional credit for remedial courses, but the credit does not count towards degree completion; and (c) use assessment tests to place participants into remedial programs.

These programs also share similar goals. The first goal is to assist students in obtaining the necessary basic skills to be successful in college-level courses and programs, thus helping them come "in line" with the mainstream of academically prepared students (Anderson & Pellinger, 1993; Clowes, 1984). The second goal is increased student persistence toward achieving educational goals. Students who were academically capable of achieving success in college-level work were also more likely to stay in college (Bean & Metzner, 1985; Tinto, 1982). Are these goals achieved through remedial programs? This study sought to answer this question.

Conceptual Framework for Remedial Education

The first goal of remedial education is to assist students in achieving the necessary basic skills to be successful in college-level courses and programs, which is related to the first guiding question in this study. How do educators help students succeed? What is the basis upon which remedial programs are established? With the community college open door policy, many students begin their studies with past

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negative educational experiences and deficient academic skills. What theories exist that can guide the effective delivery of remedial education so that the desired outcomes, academic achievement and persistence, are achieved?

Academic achievement can be related to Bloom's (1976) learning theory. Bloom identified three interdependent variables central to the theory of learning: (1) the extent to which the student has already learned the basic skills necessary for the task, (2) the extent to which the instruction is appropriate, and (3) the extent of motivation to engage in the task. Remedial educators address variable 1, the basic skills necessary for the task, by helping students attain the necessary reading, writing, and/or mathematics skills necessary for college-level work. Variable 2, appropriate instruction, must be encouraged and developed by the college leadership through an emphasis on excellence in teaching. Variable 3, motivation, is more difficult, particularly with nontraditional students who have many extraneous factors impacting their learning. How can community college instructors tap the positive correlation reported by Lavin (1965) between "achievement motivation and school performance" (p. 109)? How do educators motivate students to want to achieve academically and stay in school?

Integration theory, established by Tinto (1982) and Bean and Metzner (1985), provides a partial answer to these questions. Students who have a sense of being academically integrated with the institution, in other words, the students who feel they are capable of achieving success in the academic programs, have a far greater chance for academic achievement and retention than students who do not feel capable. This theoretical base provides support for both goals, academic achievement and persistence.

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Tinto's (1982) model postulated that persistence is a product of the interaction among variables such as students' background, educational/career goals, and institutional commitment. The result is a degree of academic and social integration with the institution, which was found to positively influence student persistence (Webb, 1989). Tinto, however, placed more emphasis on social integration than academic integration, which did not fit the older, commuting community college student. Tinto himself noted that his model has limitations, including its lack of sensitivity in determining the relationship among variables for two-year college students.

Bean and Metzner (1985) proposed another conceptual model for the community college. In their model, nontraditional students are defined as students who are older than 24 years and commute and/or attend part-time. While Tinto's (1982) model relied on socialization of students as an important variable, Bean and Metzner indicated that academic variables have the most effect on student attrition. Webb (1989) reviewed retention literature on two-year and four-year commuter colleges and found that studies by Pascarella and Chapman in 1983 and Tinto in 1982 determined that academic integration has a greater indirect positive effect on student persistence than social integration.

Therefore, based on Bean and Metzner's findings, the author limited this study to the concept of academic integration as the primary influence on student academic achievement and persistence. Academic integration is determined by the students' performance and intellectual development while attending college (Bean & Metzner, 1985). If remedial education courses build basic skills and enhance academic performance, students who need remediation and subsequently complete remedial courses in reading, writing, and mathematics are in a better position to

achieve academic integration than students who need remediation and do not complete remedial coursework. Since the students' level of academic integration into the academic environment of the institution is thought to have a positive effect on retention, it follows that students completing remedial courses have a better chance to stay in school (Bean & Metzner, 1985; Peglow-Hoch & Walleri, 1990; Webb, 1989).

Thus, within the conceptual framework of Bloom's (1976) learning theory and Bean and Metzner's (1985) academic integration theory, remedial education programs should be effective in enhancing student academic achievement and student persistence. This study examined this premise.

Evaluating the Effectiveness of Remedial Education

Based on academic integration theory, this study defined remedial education effectiveness as helping students attain the basic skills necessary to succeed in college-level courses (academic achievement) and helping students stay in school (persistence), and structured the study's two guiding questions around this definition. The study's first question asked whether academically underprepared students who complete remediation achieve greater academic success than those who do not complete remediation. The study's second question asked whether the academically underprepared students who completed remediation persisted longer those who did not complete remediation.

These goals for remedial education are supported in the literature. A survey of colleges, conducted by the Virginia State Board for Community College and the State Council of Higher Education Joint Task Force on Remediation (1988), revealed that the most common measures used to determine success of former remedial

students include grade point averages, course grade performance in appropriate college-level courses, and persistence rates.

The Community College Roundtable, a special purpose group of community college administrators, university professors, and higher education officials, convened to identify core indicators of institutional effectiveness. The result of their effort was a special report, *Community Colleges: Core Indicators of Effectiveness* (1994), in which criteria were identified to help community colleges assess their effectiveness in the areas of student achievement and success. For remedial educational programs, student success in subsequent college-level courses and student persistence were identified as the core indicators to determine whether remedial education programs were successful.

Clowes (1984) suggested a four-stage model to evaluate the effectiveness of remedial education programs. In the first stage, the remediation phase, courses and activities are assessed. During the second stage, the interface phase, students move into the mainstream, and the sequencing between the remedial and the college-level programs is assessed. Stage three, the normative phase, uses student progress to reassess program goals, while stage four, the reassessing measures phase, uses comparative studies to develop measures to reassess the evaluative criteria in stages one and two. This study focuses on Clowes' stage three, assessing student progress. As Clowes (1984) pointed out:

> The proof of the quality of a remedial program exists not in the ability of students to survive within the program but rather in the ability of students to complete the remedial program and make a successful transition into the mainstream curricula of the institution ... their achievement in these courses (mainstream curricula) is a measure of the success and quality of the remedial program. (p. 15)

The need to evaluate remedial programs is growing. Much attention has been given to the evaluation of remedial programs because of the significant resources expended and the tremendous growth in the number of remedial programs (Bers, 1986; Lively, 1995a; Manno, 1995). It was clear in the literature that the preferred method to evaluate remedial programs was through the examination of student academic success in college level courses and student persistence. It was also clear in the literature that the majority of community colleges were not using these criteria to evaluate remedial programs. Rather than using academic achievement in college-level courses and student retention, community colleges were more typically using evaluation methods within the remedial context (National Center for Educational Statistics, 1991). Examples of these evaluative methods were pre- and posttesting within remedial courses, student evaluations of course or program, faculty evaluation of course or program, and student completion rate for the remedial course or program.

Change appears necessary from the current practice described above to a more comprehensive evaluation method to determine if, in fact, remedial programs are helping students move into the academic mainstream. The academic mainstream, as defined and tested in the hypothesis of this study, can be achievement in college-level math and English, cumulative grade point average, and total number of credit hours earned (persistence) over a specified period of time.

Studies Evaluating the Effectiveness of Remedial Programs

The number of research studies evaluating the effectiveness of remedial programs is growing. However, many of the studies are descriptive, providing demographic information regarding the remedial students but not comparing program

outcomes for remedial students with nonremedial students. The relatively small number of studies that evaluate remedial programs by comparing outcomes among groups report mixed findings regarding the effectiveness of college level remedial courses.

The following review of literature was limited to studies that report findings on the effect of remedial education programs on retention and student achievement in the academic mainstream.

Studies Reporting Academic Achievement Results

Studies have been completed comparing the academic achievement of underprepared students who complete remedial courses with underprepared students who do not complete remedial courses. Some of these same studies also compared the academic achievement of underprepared students who complete remedial courses with prepared students who did not need remediation. The studies most often considered grade point average and achievement in sequential college-level courses (i.e., college-level English and math) as the dependent variables and indicators of academic success.

Several authors found a positive relationship between completing remedial courses and academic success. Hyde (1992) compared two groups of students, those needing remediation and completing remedial courses and those needing remediation who did not take remedial courses (because they received an "override" from a faculty advisor). Findings indicated that those who accepted placement advice and enrolled in remedial courses did better in English, math, psychology, and history (college-level courses) than those who did not enroll in remedial courses.

Feingold's (1994) comparison of remedial and nonremedial students sought to validate the purpose of remedial education to serve as an equalizer so that students needing and completing remediation would do as well academically as students not needing remediation. She concluded that students completing remediation did have comparable success to those students not requiring remediation.

Sinclair Community College in Dayton, Ohio (1994) completed a three-year study of all first-time degree-seeking students who enrolled in the fall of 1990. They found that students who completed all indicated remedial courses were more likely to succeed in English and math than those who took only some of the recommended remedial coursework. Sinclair reported, though, that the underprepared students who completed all remedial coursework did not perform better than nonremedial students. Seybert and Soltz (1992) reported that students who took remedial courses typically received passing grades in higher level classes related to their remedial work, although their grades and course completion rates were lower than the college-wide averages for the same courses. Long (1993) and Brady (1994) completed similar studies and also found positive relationships between completion of remedial courses and academic achievement. Burley (1993) completed a meta-analysis of 168 college remedial programs and reported that "on the whole, college developmental studies programs did seem to provide a positive impact on underprepared college student achievement, attitude, and persistence" (p. 6).

Other studies have not been able to find a relationship between remediation and academic success. Rasnke (1991) reported that remedial reading and writing prepared students for college-level English, but remedial math did not prepare students for college-level math. England (1993) evaluated remedial students' performance on the Texas Academic Skills Program (TASP) examination. Findings

revealed that although students may be successful in college studies, a substantial number had failed to pass the basic skills TASP examination. McMorris (1995) found that remediation in math, reading, and writing had no impact on success in college-level English and math courses.

Studies Reporting Persistence Results

Few studies have been completed pertaining to the effects of remedial education programs on the students' persistence towards achieving their educational goals. The results were mixed. Sinclair Community College (1994) reported that students who took all recommended remedial coursework had higher persistence rates than those who took only some remedial coursework, no remedial coursework, or did not need remediation. Brady (1994) reported that financial aid was the greatest predictor of re-enrollment rather than completing remedial coursework. Students who received financial aid were 2.7 times more likely to re-enroll than students who did not receive financial aid. Rasnke (1991) likewise did not find a positive relationship between remediation and persistence. He found that the graduation rate for remedial students was 7.5% compared to 28.8% for nonremedial students. Persistence rates varied by 10% between the two groups, with the remedial group being the lower (Rasnke, 1991). Burley's (1993) meta-analysis revealed that, of the 168 remedial programs studied, completion of remedial courses appeared to have a positive effect on persistence. On the other hand, the National Center for Educational Statistics (1991) reported that only one half of all colleges offering remedial programs tracked persistence rates for remedial students.

In summary, relatively few studies have been completed evaluating the effectiveness of remedial education in terms of academic achievement and

persistence, and the results were mixed. These studies point to the need to conduct this study measuring the effectiveness of remedial education in terms of student academic achievement and persistence towards education goals.

The Need for This Study

There has been and continues to be a need for studying the effectiveness of remedial education. In 1968, Roueche completed a national study of remedial educational programs in the junior colleges. He determined that, indeed, programs were offered, but their effectiveness had not been thoroughly researched (Roueche & Roueche, 1993). In 1983, Boylan reviewed over 60 individual efforts to evaluate remedial programs. He determined that remedial programs did have some impact on short-term retention and grade point average, but warned that more research was needed regarding remedial education's impact on grades in college-level courses and longer-term retention. In 1991, the National Center for Educational Statistics completed a study of college remedial education. One goal of the study was to compare persistence rates for college freshmen enrolled in at least one remedial course with all other freshmen. However, this goal was not attainable because too few institutions kept these data (National Center for Educational Statistics, 1991). In 1992, the Southern Regional Education Board conducted a survey of the colleges and universities offering remedial education programs in 16 southeastern states and found that less than half were able to report retention rates for remedial students compared to nonremedial students (Abraham, 1992). The literature review completed for this study indicated that since 1992 an increased number of studies have been completed to evaluate remedial education compared to the number of studies prior to 1992. However, considering that 91% of all community colleges offer remedial

programs, there appears to be a need to evaluate remedial education on a more comprehensive level.

As a result of the literature review, this study was designed for the purpose of more comprehensively evaluating remedial education by testing two conceptual hypotheses: first, that academically underprepared students who complete remediation achieve greater academic success in college-level courses than academically underprepared students who do not complete remediation; and second, that academically underprepared students who complete remediation persist longer than academically underprepared students who do not complete remediation.

Clowes (1984) stated that "the true test of a remedial program occurs when the students move into the mainstream curriculum" (p. 15). This study attempts to respond to the need for additional evaluation of remedial education to determine if students completing such programs are prepared for college-level, mainstream courses.

Summary

Based on Bloom's (1976) learning theory and Bean and Metzner's (1985) academic integration theory, students have a better chance for academic achievement and persistence towards educational goals if they are academically capable of completing college-level work, and thus capable of being integrated successfully into the academic mainstream. Unfortunately, many incoming students enter open door community colleges with deficient reading, writing, and math skills and, consequently, are not ready for college-level work. To meet these academically underprepared students' needs, 91% of all community colleges offer remedial courses (Knopp, 1995). Have these remedial courses prepared academically underprepared

students for college-level work and helped them persist towards their educational goals? The literature contained relatively few studies that evaluated remedial education in terms of student persistence and academic achievement.

Therefore, this study examined the effectiveness of remedial education courses by testing two conceptual hypotheses. The first conceptual hypothesis was that academically underprepared students who complete remedial education courses would be more successful in college-level courses than academically underprepared students who do not complete remedial courses. The second conceptual hypothesis was that there would be a difference in persistence between academically underprepared students who complete remediation compared to academically underprepared students who do not complete remediation.

The methodology for answering these two questions is described in Chapter III

CHAPTER III

METHODOLOGY

This study examined the effectiveness of remedial education programs in terms of student academic achievement and student persistence towards achieving educational goals. This chapter describes the student population, the instrument, the variables, the research design, statistical analysis, and limitations of the study.

Population

The population for this study was all academically underprepared, full-time, associate degree-seeking students who entered Ivy Tech State College for the first time in 1994 summer term and fall semester.

Ivy Tech State College is a statewide two-year technical college serving Indiana citizens from 22 instructional sites located in thirteen regions across the state. Ivy Tech offers one-year technical certificate and two-year associate degree programs. Although the primary college mission is occupational education, there is a transfer function that enables Ivy Tech graduates to complete a baccalaureate degree at selected four-year universities. Total enrollment in fall 1994 was 31,379 students with a full-time equivalent of 15,355 students. The student population includes 82% Caucasians, 10% African-Americans, 2% Hispanic, and 6% other minorities. Fifty-nine percent are female and 41% are male. The students' average age is 29.7 years.

The study was limited to academically underprepared full-time, two-year associate degree-seeking students for several reasons. First, only academically

underprepared students were included because the study focused on this group of students. Second, the full-time status, defined as 12 or more credit hours attempted per semester, provided more homogeneity to the student population. This homogeneity was the result of full-time students having more common characteristics than a combination of full- and part-time students (Cross, 1981). Throughout the study, however, students remained in the population even if their status changed from full- to part-time.

Third, this study was limited to the associate degree-seeking students since they must complete college-level English and math (one of the study's outcomes measures), whereas one-year technical certificate students do not necessarily have English and math requirements. Also, limiting the study to degree-seeking students provided a population with similar educational goals. Students transferring in English and math credits from other colleges were not included in this study because these students do not need to complete English or math at Ivy Tech. Including only students who needed college-level English and math also provided for more homogeneity in the population.

Descriptive statistics such as age, gender, ethnicity, and educational background were identified for the population.

Instrumentation

In order to determine if the students in this study were academically underprepared, they were assessed using the Assessment of Skills for Successful Entry and Transfer (ASSET) instrument, a product of the American College Testing Corporation, to measure reading, writing, and math skills. ASSET became widely used by two-year community and technical colleges in the 1980s. Recent estimates

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indicate that over 500 community and technical colleges use ASSET and that annually approximately 850,000 entering two-year college students are initially tested with ASSET (American College Testing, 1994). The ASSET technical manual reported a Kuder-Richardson 20 reliability coefficient in scaled scores of .87 for writing, .78 for reading, and .86 for math (American College Testing, 1994). Content validity was established through statewide Ivy Tech faculty committees in conjunction with ACT personnel.

Students who had already completed a college-level English and/or math class were exempt from ASSET as were those who already possessed a degree from another college or university. These students were not included in the study.

Standard scores on the ASSET ranged from 23 to 55. Students with scores less than 40 in reading, writing, or math were required to take the corresponding remedial course. Students with scores greater than 40 could enroll directly in college-level courses.

Reading, Writing, and Math Scores

The students' ability level in reading, writing, and math was measured by ASSET results. Student with scores above 40 on the ASSET reading, writing, or math tests were identified as academically prepared and ready to enroll in college-level courses. Students with scores less than 40 on the reading, writing, or math tests were identified as academically underprepared and in need of remediation prior to enrollment in college-level courses.

Although remediation was required if indicated by the ASSET scores, students sometimes received waivers from their advisors and did not enroll in remedial courses, but rather enrolled directly in college-level English and math

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courses. There may have been several reasons for faculty advisors giving waivers. The students might have given the advisor excuses why they could not enroll in remedial classes. Examples of these excuses may have been that they needed to obtain marketable occupational skills quickly and did not have time for remediation. Another example might have been that they believed they didn't perform as well on the ASSET test as they could have; they really had the ability to complete college-level work, but that ability was not reflected in the ASSET scores. Yet another example might have been financial; the students may have said that they couldn't afford financially to take extra remedial classes.

Regardless of the reasons for the waiver, the end result was that academically underprepared students enrolled directly into college-level classes without remediation.

This study, then, compared two groups of academically underprepared students. The first group consisted of those academically underprepared students who completed remedial courses. The second group consisted of those academically underprepared students who did not complete remedial courses.

The demographic differences between the two groups of students were examined in this study. Possible differences included age, gender, ethnicity, and educational background.

Academic Achievement and Persistence

The effectiveness of the remedial courses was measured by student academic achievement and student persistence. Academic achievement was operationalized first by using the students' cumulative grade point average (GPA). The GPA was based on a 4.0 scale with a grade of A worth 4 quality points, B worth 3, C worth 2, D

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worth 1, and F worth 0. Incomplete grades and withdrawals were also worth 0. The measure used for the cumulative grade point average was the cumulative GPA for the last semester a student was enrolled at Ivy Tech.

Academic achievement was also operationalized by using grades earned in college-level English and math courses. The same grading scale as the GPA was used—A worth 4 points, B worth 3, C worth 2, D worth 1, and F, I, and W worth 0.

Student persistence was operationalized by adding the students' total credits earned during the time period from fall 1994 to spring 1996. This measure was named "accumulated credit hours."

This study searched for evidence that remedial education prepared students for college-level course work and enabled students to integrate academically into the college setting (Bean & Metzner, 1985). The causal-comparative method was used to compare academic achievement and persistence outcomes for first-year Ivy Tech State College students who either did or did not enroll in remedial education courses.

Data were collected through the Ivy Tech State College Office of Education and Planning. All student records were maintained in the college's Student Information System (SIS) computer. A computer program using specialized software was written to accumulate information for the student population identified for this study. This information included descriptive student characteristics (for example, age, gender, ethnicity), ASSET scores in reading, writing, and math, cumulative grade point average for the last semester attended, completion of remedial writing and remedial math, grades earned in college-level English and math, and number of semesters completed. Permission to use student records for research was obtained from the Vice President of Education and Planning. Approval to conduct the research

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was sought and obtained from the Western Michigan University Human Subjects Institutional Research Board (See Appendix A).

Treatment—Remediation in Reading, Writing, and Math

Students whose ASSET scores are below 40 are advised to enroll in remedial reading, writing, or math courses. Although remediation is considered a requirement, some students obtain waivers from faculty advisors and do not enroll in remedial courses.

The remedial program consists of six courses, two in each subject area (reading, writing, math). Thus, students who enroll in remediation may need as few as one or as many as six remedial courses. For the purposes of this study, three groups of students were examined: those who completed all remediation, those who completed some remediation, and those who completed no remediation as indicated by ASSET scores.

The remedial writing course sequence, BSA024 and BSA025, prepares students for entry into college-level English. Learning activities center on developing control of the writing process as evidenced by writings that are focused, organized, and well developed.

The reading course sequence, BSA031 and BSA032, is designed to increase performance in reading comprehension, vocabulary, and flexibility. Critical reading strategies for effective study are emphasized.

The two remedial math courses include a general math review, BSA044, and an introductory algebra course, BSA050. The general math course reviews fractions, decimals, ratios, proportions, percents, measurement, signed numbers, equations and their applications. The introductory algebra course concentrates on integer

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components, scientific notation, algebraic equations, factoring, and graphing skills in preparation for college-level math.

Course requirements and outcome expectations for each of the remedial courses are consistent throughout the statewide system.

Hypotheses

Are remedial programs effective? Do underprepared students who complete remedial courses have greater success academically and persist longer than underprepared students who do not complete remediation? Clowes (1984) pointed out that remedial programs' effectiveness can be measured only by the students' "successful transition into the academic mainstream curricula of the institution" (p. 15). Likewise, the Community College Roundtable (1994) stated that student success in college-level courses and student persistence are the core indicators to determine whether remedial programs are effective.

It was within this framework that the two guiding research questions for this study were constructed. The first question asked whether academically underprepared students who complete remediation achieve greater academic success in college-level courses than academically underprepared students who do not complete remediation. The second question asked whether academically underprepared students who complete remediation persisted longer than academically underprepared students who did not complete remediation. In order to answer these guiding questions, two conceptual hypotheses and corresponding operational hypotheses were written and tested as described in the following sections.

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Remedial Education Versus Academic Achievement

The study's first guiding question asked about the effectiveness of remedial education in terms of academic achievement. To answer this question, the first conceptual hypothesis examined the relationship between remedial education and academic achievement. Specifically, the first conceptual hypothesis stated that academically underprepared students who completed required remedial education courses would be more successful in college-level courses than academically underprepared students who did not complete required remedial courses.

This conceptual hypothesis was operationalized by comparing students who completed remediation with students who did not complete remediation in terms of grades earned in college-level English and math as well as overall academic achievement (cumulative grade point average). More specifically, the following three operational hypotheses were tested:

1. *English.* The mean college-level English grade average, based on a 4.0 scale, for academically underprepared students who complete remedial writing would be higher than the mean college-level English grade average for academically underprepared students who do not complete remedial writing.

This operational hypothesis was tested by calculating the mean grade point average in the English college-level course. The results were compared for the two groups, those underprepared students who completed remedial writing and those underprepared students who did not complete remedial writing, using the *t* test for independent means to see if there was a difference. The alpha was set at .05.

2. *Math.* The mean college-level math grade average, based on a 4.0 scale, for academically underprepared students who complete remedial math would be higher

than the mean college-level math grade average for academically underprepared students who do not complete remedial math.

This operational hypothesis was tested using the same method as the first operational hypothesis. The mean grade point average for college-level math was calculated for both groups. The results were compared using the *t* test for independent means to see if there was a difference. The alpha was set at .05.

3. *Overall Academic Achievement.* Academically underprepared students who complete required remedial education courses would have a higher cumulative grade point average than academically underprepared students who do not complete required remedial education courses.

The third operational hypothesis was tested in two ways. First, the total academically underprepared population (all students who needed remediation in reading, writing, and/or math) was divided into two groups: those who completed all remediation and those who did not complete all remediation. The second group, those who did not complete all remediation, was further divided into two subgroups: those who completed some remediation and those who completed no remediation. One-way analysis of variance (ANOVA) was used to determine if there was a difference in the mean cumulative grade point average for the three groups: those academically underprepared students who needed and completed (1) all remediation, (2) some remediation, and (3) no remediation. The alpha was set at .05. Post hoc analysis was conducted using the Scheffe test to support the results.

The second way that the third operational hypothesis was tested involved comparing the cumulative grade point average for those underprepared students who completed remediation with those who did not complete remediation in specific content areas (reading, writing, and math). For example, the mean cumulative GPA

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for those who needed and completed remedial reading was compared to the mean cumulative GPA for those who needed but did not complete reading to determine if there was a difference. The same comparison was made for math and writing. The *t* test for independent means was used to determine if differences existed, with the alpha set at .05.

Remedial Education Versus Persistence

The study's second guiding question asked about the effect of remediation on student persistence. Thus, the second conceptual hypothesis examined the academically underprepared student population in terms of persistence towards achieving educational goals. The second conceptual hypothesis stated that academically underprepared students who complete required remedial courses would have a greater persistence rate than academically underprepared students who do not complete remedial courses.

This conceptual hypothesis was operationalized using the total earned credit hours accumulated from fall 1994 through fall 1996. More specifically, the operational hypothesis stated that the mean number of accumulated credit hours earned between fall 1994 and fall 1996 by academically underprepared students who completed remedial courses would be greater than the mean number of accumulated credit hours earned by academically underprepared students who did not complete remediation.

The same methodology used for measuring differences in cumulative grade point average was used to measure differences in accumulated credit hours for three groups of academically underprepared students: those who completed all remediation, those who completed some remediation, and those who complete no

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remediation. This operational hypothesis was tested using one-way analysis of variance to see if there was a difference among the three groups. The alpha was set at .05. Post hoc analysis was conducted using the Scheffe test.

Differences in accumulated credit hours were also examined by content area (reading, writing, and math). For example, the mean accumulated credit hours for those academically underprepared students who completed remedial math was compared to the mean accumulated credit hours for those students who did not complete remedial math. The *t* test for independent means was used to determine if there was a difference in accumulated credit hours. The alpha was set at .05. The same analysis was made for reading and writing.

For further clarification, Table 2 presents the variables in the two conceptual hypotheses along with the corresponding operational variables.

Table 2

Relationship Between Remediation and Student Academic Achievement and Persistence

CONCEPTUAL	OPERATIONAL		
1. Relationship Between Remedial Courses and Academic Achievement	Remedial Writing and College-level English	Remedial Math and College-level Math	Remedial Course Completion and Cumulative Grade Point Average
2. Relationship Between Remedial Courses and Persistence	Remedial Course Completion and Total Credit Hours Accumulated		

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Methodology Summary

This study was conducted in response to the literature which pointed to the need for more information regarding the effectiveness of remedial education. Such information would be useful for students as they strive to be successful in the educational system, and for instructors, counselors, and administrators as they work to improve the educational process.

With this in mind, this study examined the effectiveness of remedial education by looking at whether academically underprepared students who completed remedial education courses (a) were more successful in college-level courses, and (b) persisted longer toward reaching educational goals than academically underprepared students who did not complete remedial education courses. The population included all academically underprepared, full-time, associate degree-seeking students who entered Ivy Tech State College summer term or fall semester in 1994.

CHAPTER IV

FINDINGS

The purpose of this study was to examine the effectiveness of remedial education. The two guiding questions, presented in Chapter I, provided the structure for the study. The first guiding question pertained to remedial education's effectiveness in terms of academic achievement, and the second guiding question pertained to remedial education's effectiveness in terms of student persistence towards achieving educational goals. Were there differences between academically underprepared students who completed remediation and academically underprepared students who did not complete remediation in terms of academic achievement (grade point average, college-level English and math grades), and persistence (total accumulated credit hours)?

To answer these questions, two conceptual hypotheses were formulated. The first conceptual hypothesis was related to the first guiding question pertaining to the relationship between remedial education and academic achievement. The second conceptual hypothesis was related to the second guiding question pertaining to the relationship between remedial education and student persistence towards achieving educational goals. This chapter presents a description of the population demographics and the findings of the study with respect to each of the two conceptual hypotheses.

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Population Demographics

The population for this study was all academically underprepared, full-time, associate degree-seeking students who entered Ivy Tech State College for the first time in the 1994 summer term and fall semester. Academically underprepared students were identified based on ASSET scores in reading, writing, and math. Of 875 total full-time associate degree-seeking students who took ASSET enrolling in summer/fall 1994 for the first time, 766 students scored below the cut-off ASSET score in reading, writing, and/or math, thus indicating a need for remediation. These 766 students comprised the academically underprepared population for this study.

For a greater understanding of this population, the group demographics were reviewed for characteristics of ethnicity, age, gender, and previous educational level. Students reported demographic information about themselves as part of the ASSET documentation. Students possibly could elect not to report certain demographic information. Therefore, some data were missing for those students who chose not to respond to certain questions regarding demographics on the ASSET pretest form.

The demographic description is for the total academically underprepared student population. Table 3 presents the demographic information for this group. The 766 academically underprepared students are 86% Caucasian compared to 12% minority (2% nonreported). The ages range from 18 to 56, with a mean age of 25.6. Females comprise 58% of the population while males comprise 41% (1% nonreported). The students' previous academic level was divided into three categories: those students not yet possessing a high school diploma or GED (5%), those possessing a high school diploma or GED (77%), and those having completed some college (10%). Eight percent do not report previous academic level.

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These results are consistent with Knopp's (1995) remedial student profile and the American Council on Education's (1995) description of students taking remedial courses. Compared to the total Ivy Tech student population, there are 4% more Caucasians in the remedial group (86% for remedial versus 82% for the total population). The mean age for the remedial population is 4 years younger (25.6 mean age for remedial versus 29.7 mean age for total population). The male/female proportion is about the same for both the remedial and the total population.

Table 3

Demographic Data Pertaining to Summer/Fall 1994 Full-Time, Associate Degree-Seeking, Academically Underprepared First-Time Students, n = 766

Characteristic	Number	Percentage
Ethnicity		
Caucasian	659	86%
Minority	93	12%
No Response	14	2%
Educational Background		
No High School Diploma	38	5%
GED or High School	590	77%
Some College	77	10%
No Response	61	8%
Gender		
Male	312	41%
Female	448	58%
No Response	6	1%
Age	mean age = 25.6	

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Findings—Hypothesis 1: Remedial Education Versus Student Academic Achievement

The study's first guiding question asked whether academically underprepared students who complete remediation achieve more academically than academically underprepared students who do not complete remediation. To answer this question, the first conceptual hypothesis was formulated with three related operational hypotheses.

The first conceptual hypothesis stated that academically underprepared students who completed remedial courses would be more successful in college-level courses than academically underprepared students who did not complete required remedial courses. This conceptual hypothesis was operationalized by comparing students who completed remediation with students who did not complete remediation in terms of grades earned in college-level English and math as well as cumulative grade point average. Following are the results for each of the three operational hypotheses.

Remedial Writing Versus College-Level English

The first conceptual hypothesis stated that academically underprepared students who completed remedial courses would be more successful in college-level courses than academically underprepared students who did not complete required remedial courses. This conceptual hypothesis was tested with three operational hypotheses. The first operational hypothesis stated that the mean college-level English grade average, based on a 4.0 scale, for academically underprepared students who completed remedial writing would be higher than academically underprepared students who did not complete remedial writing.

The results from testing the first operational hypothesis regarding the relationship between remedial writing completion and college-level English grades are presented in Table 4. A total of 255 students needed remedial writing. Of these students, 134 completed remedial writing and 121 did not. A numerical value was assigned to letter grades in order to determine mean scores. A grade of "A" was assigned a value of 4, "B" a value of 3, "C" a value of 2, "D" a value of 1, "F" or "W" (withdraw) received a value of 0.

Results of the *t* test for independent means indicated that the group of academically underprepared students who completed remedial writing earned an average college-level English grade of 2.19. Academically underprepared students who did not complete remedial writing earned an average college-level English grade of 1.46, $p < .05$. Thus, the first operational hypothesis that the mean college-level English grade average would be higher for underprepared students who completed

Table 4

Remedial Writing Versus College-Level English Achievement

Completer/ Noncompleter	No. of Students	Mean	*SD*	*p*
Needed and Completed Remedial Writing	134	2.19	1.32	.000*
Needed and Did Not Complete Remedial Writing	121	1.46	1.52	

* $p < .05$

remedial writing than for students who did not complete remedial writing was supported.

Remedial Math Versus College-Level Math

The first conceptual hypothesis stated that academically underprepared students who completed remediation achieved greater academic success than students who did not complete remediation. This conceptual hypothesis was tested with three operational hypotheses.

The first operational hypothesis, described above, tested the relationship between remedial writing and college-level English. The second operational hypothesis stated that the mean college-level math grade average, based on a 4.0 scale, for academically underprepared students who completed remedial math would be higher than academically underprepared students who did not complete remedial math.

Results from testing the second operational hypothesis regarding the relationship between remedial math and college-level math are presented in Table 5. A total of 721 students needed remedial math. Of these students, 357 completed remedial math and 364 did not. The same numerical value as college-level English was assigned to letter grades earned in college-level math. Results of the *t* test for independent means indicated that the group of academically underprepared students who completed remedial math earned an average college-level math grade of 1.68 which was significantly greater than the average college-level math grade of .76 earned by the academically underprepared students who did not complete remedial math, $p < .05$. Thus, the second operational hypothesis that the mean college-level math

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grade average would be higher for students who completed needed remedial math than for students who did not complete remedial math was supported.

Table 5

Remedial Math Versus College-Level Math Achievement

Completer/ NonCompleter	No. of Students	Mean	*SD*	*p*
Needed and Completed Remedial Math	357	1.68	1.54	.000*
Needed and Did Not Complete Remedial Math	364	.60	1.27	

*$p < .05$

The Relationship Between Remediation and Overall Academic Achievement

The first conceptual hypothesis stated that academically underprepared students who completed remediation would achieve greater academic success than academically underprepared students who did not complete remediation. This conceptual hypothesis was tested with three operational hypotheses. The first two operational hypotheses tested the relationships between remedial courses and college-level English and math. The third operational hypothesis stated that academically underprepared students who completed remedial education courses would have a higher cumulative grade point average (GPA) than academically underprepared students who did not complete remedial courses.

This operational hypothesis was tested in two ways. First, the 766 academically underprepared students were divided into two groups: students who

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completed all remediation as indicated by ASSET (n = 314) and students who did not complete all remediation (n = 452). The second group of 452 students who did not complete all remediation was further divided into two subgroups: underprepared students who completed some remediation (n = 176) and underprepared students who completed no remediation (n = 276). So, comparisons for the mean cumulative GPA were made for three groups: underprepared students who needed and completed (1) all remediation, (2) some remediation, and (3) no remediation. One-way analysis of variance, ANOVA, was used to compare the cumulative GPA for the three groups.

Results are presented in Table 6. Three comparisons were made. First, academically underprepared students who completed all remediation were compared with academically underprepared students who completed some remediation. The results indicated that the "completed all" group earned a 2.82 cumulative GPA, which was higher than the "completed some" group, which earned a 2.32 cumulative GPA, $p < .05$.

Second, those who completed some remediation were compared with those who completed no remediation. The "completed some" group earned a 2.32 cumulative GPA, which was higher than the "completed no remediation" group's 1.76 cumulative GPA.

Third, those who completed all remediation were compared with those who completed no remediation. The "completed all" group's 2.82 cumulative GPA was higher than the "completed no remediation" group's 1.76 cumulative GPA, $p < .05$.

For this population, academically underprepared students who completed all needed remedial courses had a higher cumulative GPA than academically

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underprepared students who completed some or none of the needed remedial courses as indicated by ASSET scores.

Post hoc analysis was conducted using the Scheffe Test. The test results from the Scheffe provided further support for the finding that academically underprepared students who completed remediation had a higher cumulative GPA than academically underprepared students who did not complete remediation.

Table 6

Remediation Versus Overall Academic Achievement (GPA)

	Group	No. of Students	Mean GPA	*SD*	*p*
1	Completed None	276	1.76	1.35	.000*
	Completed Some	176	2.32	.94	
2	Completed Some	176	2.32	.94	000*
	Completed All	314	2.82	82	
3	Completed None	276	1.76	1.35	000*
	Completed All	314	2.82	82	

*$p < .05$

Did all three remedial subject areas (reading, writing and math) have an effect on the cumulative grade point average? In order to answer this question, a second method of analysis was designed to further study the relationship between completing remediation and overall academic achievement. The third operational hypothesis stated that academically underprepared students who completed remedial courses

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would achieve higher cumulative GPAs than academically underprepared students who did not complete remediation. Was this true for all three subject areas?

To answer this question, the 766 academically underprepared students were grouped according to those who completed remedial reading, writing, and/or math and then compared with those academically underprepared who did not complete remediation in reading, writing, and/or math. For instance, the cumulative GPAs were compared for those students who needed and completed remedial reading with those students who needed but did not complete remedial reading. The same comparisons were made for writing and math.

Results are presented in Table 7. Results of the *t* test indicated that for all three subject areas (reading, writing, and math), the academically underprepared students who completed the remedial course had a higher mean cumulative GPA than the academically underprepared students who did not complete the remedial course, with $p < .05$.

In reading, those who needed and completed remedial reading had a mean GPA of 2.43 compared to a 2.06 mean GPA for those who needed but did not complete remediation, or a difference of .37 in the cumulative GPA. In writing, those who needed and completed remediation had a 2.48 mean GPA compared to a 2.05 mean GPA for noncompleters, or a difference of .43. The mean GPA for students who needed and completed remedial math was 2.76 compared to 1.83 for those who needed but did not complete remedial math, or a difference of .97 in grade point average.

This second analysis provided further support for the hypothesis that academically underprepared students who completed remediation earned a higher grade point average than those who did not complete needed remediation.

Table 7

Remediation Versus Overall Academic Achievement by Subject

Subject	Remedial Completion/ Noncompletion	No. of Students	Mean GPA	*SD*	*p*
Reading	Completers	134	2.43	1.15	.003*
	Noncompleters	121	2.06	.82	
Writing	Completers	197	2.48	.90	.000*
	Noncompleters	147	2.05	1.13	
Math	Completers	357	2.76	.83	.000*
	Noncompleters	364	1.83	1.27	

* $p < .05$

Summary

This study's first guiding question asked whether academically underprepared students who completed remediation achieved greater success in college-level courses than those who did not complete remediation. The conceptual hypothesis formulated to answer this question stated that academically underprepared students who completed remediation would be more successful in college-level courses than academically underprepared students who did not complete remediation.

This conceptual hypothesis was supported by the findings from the three operational hypotheses. First, academically underprepared students who completed remedial writing had higher college-level English grade averages than academically underprepared students who did not complete remedial writing. Second, students who completed remedial math had higher college-level math grade averages than

those who did not complete remedial math. Third, academically underprepared students who completed all remediation had higher cumulative grade point averages than those who completed some or none of the remediation as indicated by ASSET scores.

Findings—Hypothesis 2: Remediation Versus Student Persistence

This study's second guiding question asked, "Do academically underprepared students who completed remediation persist longer than academically underprepared students who do not complete remediation?" To answer this question, the second conceptual hypothesis was formulated with one related operational hypothesis.

The second conceptual hypothesis stated that academically underprepared students who completed remedial courses would have a greater persistence rate than academically underprepared students who did not complete remedial courses. This hypothesis was operationalized by stating that the mean number of earned credit hours accumulated between fall 1994 and fall 1996 by academically underprepared students who completed remedial courses would be greater than the mean number of earned credit hours accumulated by academically underprepared students who did not complete remediation.

This operational hypothesis was tested in two ways. First, the 766 academically underprepared students were divided into two groups: those who completed all remediation (n = 314) and those who did not complete all remediation (n = 452). The second group of 452 students was further divided into two subgroups: those who completed some remediation (n = 176) and those who completed no remediation (n = 276). So, the comparison for differences in accumulated credit

hours was made for three groups of academically underprepared students: those who completed (1) all remediation, (2) some remediation, and (3) no remediation.

Results are presented in Table 8. One-way analysis of variance, ANOVA, was used to compare the accumulated credit hours (a measure of persistence) for the three groups. Three comparisons were made using ANOVA. First, the academically underprepared students who completed all remediation were compared with the academically underprepared students who completed some remediation. The results indicated that the "completed all" group persisted for 48 credit hours, which was higher than the "completed some" group's persistence for 41 credit hours, $p < .05$.

Second, the "completed some" group was compared with the "completed no remediation" group. The "completed some" group persisted for 41 credit hours while the "completed no remediation" group persisted for 24 credit hours, $p < .05$.

Third, the "completed all" remediation group was compared with the "completed no remediation" group. The "completed all" grouped persisted for 48 credit hours which was higher than the 24 credit hours by the "completed no remediation" group, $p < .05$. For this population, academically underprepared students who completed all needed remedial courses had greater accumulated credit hours than academically underprepared students who completed some or none of the needed remedial courses.

Post hoc analysis was conducted using the Scheffe test. Results from the Scheffe provided further support for the finding that academically underprepared students who completed remediation persisted longer and accumulated greater credit hours than academically underprepared students who did not complete remediation.

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Table 8

Remediation Versus Persistence

	Group	No. of Students	Mean Credit Hours	*SD*	*p*
1	Completed None	276	24	24.13	.000*
	Completed Some	176	41	23.18	
2	Completed Some	176	41	23.18	.001*
	Completed All	314	48	21.28	
3	Completed None	276	24	24.13	.000*
	Completed All	314	48	21.28	

*$p < .05$

Did all three subject areas (reading, writing, and math) have an effect on student persistence? In order to answer this question, a second method of analysis was designed to further study the relationship between completing remediation and student persistence. The operational hypothesis stated that academically underprepared students who completed remedial courses persisted longer and accumulated greater numbers of earned credit hours than academically underprepared students who did not complete remediation. Was this true for all three subject areas?

To answer this question, the 766 academically underprepared students were grouped according to those who completed remedial reading, writing, or math and then compared with those academically underprepared students who did not complete remediation in reading, writing, or math. For instance, the total accumulated credit hours was compared for those students who needed and

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completed remedial writing with those students who needed but did not complete remedial writing. The same comparisons were made for reading and math.

Results presented in Table 9 indicate that for all three subject areas (reading, writing, and math), those who needed and completed the remedial course as indicated by ASSET persisted longer and earned greater accumulated credit hours than those who did not complete the needed remedial course, with $p < .05$.

Underprepared students who completed remedial reading persisted for 46 credit hours compared to 37 credit hours for those who did not complete remedial reading, a difference of 9 credit hours. Remedial writing completers persisted for 45 credit hours compared to 34 for noncompleters, a difference of 11 credit hours for the completers. There was a difference of 22 accumulated credit hours for those who needed and completed remedial math (48 credit hours) compared to those who needed but did not complete remedial math (26 credit hours).

In summary, the study's second guiding question asked whether academically underprepared students who completed remediation persisted longer than academically underprepared students who did not complete remediation. The answer was "yes." The results from the operational hypothesis indicated that academically underprepared students who completed remediation earned more accumulated credit hours than those academically underprepared students who completed some or none of the remediation as indicated by ASSET. These results provided support for the conceptual hypothesis that there was a relationship between remediation and persistence.

Table 9

Remediation Versus Student Persistence, by Subject

Subject	Remedial Completion/ Noncompletion	No. of Students	Mean Hours	*SD*	*p*
Reading	Completers	134	46	20.80	.004*
	Noncompleters	121	37	26.32	
Writing	Completers	197	45	21.91	.000*
	Noncompleters	147	34	25.91	
Math	Completers	357	48	21.73	.000*
	Noncompleters	364	26	23.48	

* $p < .05$

Summary of Results

The findings presented in this chapter answered the study's two guiding questions from Chapter I and supported the two corresponding conceptual hypotheses.

The first guiding question asked, "Do academically underprepared students who complete required remedial education courses achieve greater academic success in college-level English or math as well as overall grade average than academically underprepared students who do not complete required remediation?" The conceptual hypothesis that academically underprepared students who completed remedial courses would be more successful academically than those who did not complete remediation was supported.

The second guiding question posed in Chapter I asked, "Do academically underprepared students who complete required remedial education courses persist longer than academically underprepared students who do not complete required remedial education courses?" The conceptual hypothesis that academically underprepared students who completed remediation persisted longer than those who did not complete remediation was supported.

Academically underprepared students who completed remedial courses were more successful academically and persisted longer towards achieving educational goals than the students who did not complete remedial courses.

CHAPTER V

SUMMARY, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

How effective are remedial education programs in preparing academically underprepared students for college-level courses? This is an important question because increasing numbers of students are entering two-year community colleges with deficient reading, writing, or math skills (Roueche & Roueche, 1993; U.S. Department of Education, 1991). Academically, these students are underprepared for college-level work. Since community colleges are considered "open door" institutions, enrollment is not limited to the academically capable, but rather all citizens are welcome regardless of educational background (Roueche & Roueche, 1993). Community colleges, then, must assist those who enroll lacking the necessary basic skills in reading, writing, and math to prepare for college-level courses and to persist towards achieving their educational goals. Remedial education programs have existed since the 1800s, however, relatively little research has been completed regarding the effectiveness of such educational programs (Abraham, 1992; Knopp, 1995; Roueche & Roueche, 1993). The purpose of this study was to examine the effectiveness of remedial education programs in terms of the students' academic achievement and persistence towards educational goals.

Do underprepared students who complete remediation achieve more success academically than underprepared students who do not complete remediation? Do underprepared students who complete remedial education courses persist longer towards their educational goals than underprepared students who do not complete

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remediation? This study was designed to answer these two questions. Chapter V presents the procedures used in the study, a summary and discussion of the findings, conclusions, and recommendations for further study.

Procedures

The Ivy Tech State College Office of Education and Planning provided the data for the study including student demographic characteristics, ASSET scores, and academic records. The academic records consisted of students' grades in remedial courses, grades in college-level English and math, cumulative grade point average, and total accumulated credit hours. This information was then loaded into the Statistical Program for the Social Sciences (SPSS) software package which was used to analyze the data.

The population for this study included all full-time, associate degree-seeking students who entered Ivy Tech State College for the first time summer or fall 1994. All academically underprepared students in this population whose entrance exam (ASSET) scores indicated a need for remediation were placed into one of two groups: those who completed remediation and those who did not complete remediation. Comparisons were then made to determine if differences existed between the academically underprepared students who completed remediation and the academically underprepared students who did not complete remediation in terms of academic achievement (college-level English grades, college-level math grades, cumulative grade point average) and persistence (total accumulated credit hours).

For cumulative grade point average and total accumulated credit hours, the group of underprepared students who did not complete all remediation was further divided into two subgroups: those who completed some remediation and those who

completed no remediation. Thus, for cumulative GPA and total accumulated credit hours, three groups were compared: academically underprepared students who completed (1) all remediation, (2) some remediation, and (3) no remediation.

Summary of Findings

The findings included a description of the population demographics and the results from the two hypotheses concerning the effect of remediation on academic achievement and persistence.

Population Demographics

In order to better understand the population in the study, student demographic characteristics of ethnicity, gender, age and educational background were examined for the associate degree-seeking, full-time, academically underprepared population who enrolled summer or fall 1994.

The results indicated that the students are mostly Caucasian, more likely to be female, approximately 25–26 years old, possessing a high school diploma or GED. These results are consistent with Knopp's (1995) remedial student profile and the American Council on Education's (1995) description of students taking remedial courses, but slightly different than Cross's (1981) underprepared student profile. Cross identified the student population as more likely to be older, female, and minority. Ivy Tech's population is older and female, but more likely to be Caucasian rather than minority as described by Cross.

The investigator then examined the differences in level of academic achievement and persistence between academically underprepared students who

completed remediation and academically underprepared students who did not complete remediation.

Findings—Hypothesis 1: Remedial Education Versus Student Academic Achievement

The first conceptual hypothesis that there was a relationship between remedial education and student academic achievement was supported by the findings of this study. Academic achievement was measured by grades earned in college-level English, grades earned in college-level math, and cumulative grade point average. Analysis of the *t* tests for independent means and one-way analysis of variance (ANOVA) conducted for these measures revealed that academically underprepared students who completed remediation achieved greater academic success than those who did not complete remediation. Specifically, underprepared students who completed remediation in writing, as indicated by ASSET scores, achieved significantly higher grades in college-level English (2.19 mean grade average) than those who did not complete writing remediation (1.46 mean grade average). Likewise, the underprepared students who completed remedial math earned significantly higher grades in college-level math (1.68 mean grade average) than students who did not complete remedial math (.6 mean grade average).

The cumulative grade point average (GPA) was measured two ways. First, ANOVA was used to compare three groups of academically underprepared students: (1) those who completed all remediation, (2) those who completed some remediation, and (3) those who completed no remediation. Results indicated that students who completed all needed remediation had a higher grade point average (2.83 GPA) than students who completed some remediation (2.32 GPA). Likewise, students who

completed some remediation had a higher GPA (2.32) than those who completed none of the remediation needed (1.76 GPA).

Second, the academically underprepared students were grouped according to which subject area required remediation (reading, writing, and/or math). Results from *t* tests for independent means for each of the three subject areas indicated that students who needed and completed remedial reading earned higher GPAs than students who needed but did not complete remedial reading. The same was true for remedial math and writing.

The results of these tests provided support for the first conceptual hypothesis that students who completed needed remediation had greater academic achievement than students who did not complete needed remediation.

Findings—Hypothesis 2: Remediation Versus Student Persistence

The second conceptual hypothesis in this study was that academically underprepared students who completed remediation persisted longer than academically underprepared students who did not complete remediation. Persistence was measured by the total number of accumulated credit hours earned from fall 1994 through fall 1996.

The same analysis was conducted for persistence as was conducted for cumulative grade point average. As with GPA, the first analysis divided the academically underprepared students into three groups: those who completed all, those who completed some, and those who completed none of the remediation. One-way analysis of variance results indicated that those who completed all needed remediation accumulated higher numbers of credit hours between 1994 and 1996 than those who completed some of the needed remediation (48 accumulated credit

hours compared to 41 accumulated credit hours, respectively). Likewise, those who completed some remediation accumulated a higher number of credit hours than those who completed none (41 versus 24, respectively). Students who completed all remedial courses accumulated twice as many credit hours as students who completed no remediation (48 accumulated credit hours versus 24 accumulated credit hours, respectively).

The second analysis compared academically underprepared students who completed remediation with academically underprepared students who did not complete remediation for each of the three subject areas (reading, writing, and math) in terms of accumulated credit hours. Results from the *t* tests for independent means indicated that academically underprepared students who completed remedial reading accumulated more credit hours than academically underprepared students who did not complete remedial reading. The same was true for writing and math.

These two analyses supported the second hypothesis that students who completed needed remediation persisted longer than students who did not complete needed remediation.

Discussion of Findings

The findings in this study provided support for the first conceptual hypothesis that there was a relationship between completing needed remediation and student academic achievement. The findings also supported the second conceptual hypothesis that there was a relationship between completing needed remediation and persistence towards achieving educational goals. Academically underprepared students who completed remediation achieved higher grades in college-level English and math, earned higher grade point averages, and persisted longer towards their educational

goals than students who did not complete needed remediation. These findings support Bloom's (1976) learning theory and Bean and Metzner's (1985) academic integration theory. Bloom's first interdependent variable in his learning theory stated that the extent to which students have already learned the basic skills necessary for the task has a direct effect on students' academic achievement. By helping students obtain the reading, writing, and/or math skills necessary for college-level work, remedial courses provided the basic skills foundation for the students to earn higher grades in college-level courses.

The basic skills to which Bloom referred are also referenced in Bean and Metzner's (1985) academic integration theory, which stated that underprepared students who obtain the necessary basic skills and believe they are capable of achieving success in academic programs have a greater chance for academic integration into mainstream curriculum. This academic integration enhances the students' probability of achieving academic success and persisting towards educational goals.

Based on these definitions, the results from this study provided support for both Bloom's (1976) learning theory and Bean and Metzner's (1985) academic integration theory. This support was evidenced by the higher grades earned in college-level English and math as well as the higher cumulative grade point averages and greater accumulated credit hours for academically underprepared students who completed remediation compared to academically underprepared students who did not complete remediation. With a solid basic skills foundation, the students were more likely to be academically integrated resulting in greater academic achievement and longer persistence towards educational goals.

Academic integration was evident in the mean college-level English and math grade comparisons for those who completed remediation and those who did not complete remediation. Students who needed and completed remedial writing achieved greater success in college-level English, as evidenced by the 2.19 English grade average, compared to the 1.46 grade average for noncompleters. Likewise, a difference in college-level math grade averages was found for those who completed the remedial math course compared to noncompleters (1.68 versus .6, respectively).

Further evidence supporting the importance of a basic skills foundation (Bloom, 1976) and academic integration (Bean & Metzner, 1985) was found in the comparison of mean GPA and accumulated credit hours for the three groups identified in the total academically underprepared population. Those who completed all remediation maintained a 2.83 GPA and persisted for 48 accumulated credit hours. Those who completed some remediation maintained a 2.32 GPA and persisted for 41 credit hours, and those who completed no remediation earned a 1.76 GPA and persisted for 24 credit hours. Differences existed among all three groups at the .05 alpha level. The largest difference existed between the academically underprepared students who completed all remediation compared with the academically underprepared students who completed no remediation. Specifically, those who completed all remediation had a cumulative GPA which was 1.06 higher and persisted for 24 additional credit hours than those who completed no remediation.

The "completed none" group had a mean GPA of 1.76 and persisted for 24 credit hours. In many community colleges, a 1.76 GPA would place the students on academic probation and would endanger financial aid, which can impact persistence towards educational goals. On the other hand, the "completed all remediation" group had a mean GPA of 2.83, which, on a 4.0 scale, meant the students were in good

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academic standing, and may have led to the longer persistence of 48 accumulated credit hours.

Although the greatest differences existed between the "completed all remediation" group and the "completed no remediation" group, it is noteworthy that the students who completed some remediation fared better in cumulative GPA and accumulated credit hours than the group who completed no remediation. The GPA comparison, 2.32 versus 1.76, revealed a difference as did the accumulated credit hour comparison (41 credit hours for those who completed some versus 24 for those who completed none). It appears that, even though they did not complete all needed remediation, academically underprepared students who completed some remediation achieved greater success academically and persisted longer than those who completed no remediation.

Another finding from this study which is noteworthy and supports academic integration theory, was the subject-by-subject increases in GPA and accumulated credit hours for those who completed remediation compared to those who did not complete remediation. Increases in GPA and accumulated credit hours for those underprepared students who complete remediation were found for each of the three subject areas (reading, writing, and math).

Placed in the context of academic integration and learning theory, these differences in cumulative grade point averages and accumulated credit hours indicate that underprepared students who completed remedial courses possessed the necessary basic skills necessary to be successful in college-level courses. They possibly also believed they were capable of success in academic programs and thus were able to integrate into the college mainstream (Clowes, 1984) leading to greater levels of academic achievement and persistence. It appears that by completing

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remedial courses, students not only refreshed skills in reading, writing, and/or math, but they also built confidence in their ability to be successful in the academic environment. It is possible that, by completing remedial courses, the academically underprepared students in this study enhanced their sense of academic integration which allowed them to flow into the academic mainstream, earning higher grades and persisting longer than those who did not complete needed remediation (Bean & Metzner, 1985; Clowes, 1984).

While the underprepared students who completed remediation had a record of higher grades and longer persistence towards educational goals, still there were many students who did not complete any remediation. Of the total underprepared population, 36 percent obtained waivers from their faculty advisors and did not complete remediation. Would these students have decided to complete the necessary remediation if they had known that there would be a 1.06 difference in cumulative grade point average and 24 accumulated credit hours difference between those who completed all remediation and those who completed no remediation?

This question leads to a discussion of the value of this study. There are several ways the results of this study can be useful. First, the study provides a format for evaluating remedial education programs. Traditionally, instructors have evaluated remedial courses through the use of pre- and posttests within the remedial course itself (National Center for Educational Statistics, 1991). However, a better evaluation is whether the students can move into the academic mainstream and be successfully integrated into college-level courses (Bean & Metzner, 1985; Clowes, 1984). This study, then, provides a model for such evaluation procedures.

Second, the information gathered in this study regarding the entering class of 1994 may be valuable for current students as they decide whether or not to seek a

waiver for remedial courses. Should they spend the time, effort and money on taking remedial courses in reading, writing and/or math? Factual data regarding past student success rates may be a persuasive factor in their decision.

Third, the information gathered from this study may be helpful for faculty advisors as they counsel students regarding the importance of completing remedial education courses as indicated by ASSET scores. Faculty may be less willing to give waivers which allow academically underprepared students to bypass remediation. Both faculty and students may view completing remedial courses as a means to improve student academic achievement and increase persistence towards educational goals.

Fourth, community college administrators may use the evaluation procedures as a model to evaluate their own remedial programs. Ongoing evaluation regarding the effectiveness of remedial programs is necessary because it provides information regarding whether remedial programs are preparing students to enter the academic mainstream. The Community College Roundtable in their publication, *Community Colleges: Core Indicators of Effectiveness* (1994), identified subsequent success in college-level courses and student persistence as the core indicators for measuring the success of remedial programs. It is possible, then, that other community colleges may adopt this type of study to measure the effectiveness of their remedial programs.

Recommendations for Further Study

Based on the results of this study, there are opportunities for further study. This study focused on full-time students attending a two-year college. The same study should be completed focusing on part-time students. Many students who attend two-year colleges are, in fact, part-time because of family and work responsibilities.

(Knopp, 1995). Information regarding the effectiveness of remedial education for part-time students may be beneficial.

While there was a difference in the college-level math mean grade average when comparing remedial math completers with noncompleters, the 1.68 grade average, based on a 4.0 scale, for completers is still below an average grade. This indicates a need for further study regarding the effectiveness of math remediation.

Study is needed regarding methodology for encouraging students to complete their remedial courses. What techniques are effective in increasing the proportion of students who complete remediation? Last, in line with the recommendation of the Community College Roundtable (1994), this same study should be replicated at other two-year colleges. Ninety-one percent of all community colleges offer remedial courses (Knopp, 1995). Many cannot report academic success in mainstream curriculum or persistence rates (Abraham, 1992; National Center for Educational Statistics, 1991). Increased numbers of studies are beginning to take place; however, more research is needed to examine the effectiveness of remedial education in terms of academic achievement and student persistence towards educational goals.

Appendix A

Approval Letter From the Human Subjects
Institutional Review Board

Human Subjects Institutional Review Board

Kalamazoo, Michigan 49008-3899

WESTERN MICHIGAN UNIVERSITY

Date: 31 January 1997

To: David Cowden, Principal Investigator
Lyn Batzer, Student Investigator

From: Richard Wright, Chair

Re: HSIRB Project Number 96-12-16

This letter will serve as confirmation that your research project entitled "The Effect of Remedial Programs on Academic Achievement and Retention at the Two-Year Community College" has been **approved** under the **expedited** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you must seek specific approval for any changes in this design. You must also seek reapproval if the project extends beyond the termination date. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: 30 January 1998

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Human Subjects Institutional Review Board

Kalamazoo, Michigan 49008-3899

WESTERN MICHIGAN UNIVERSITY

Date: 31 January 1997

To: David Cowden, Principal Investigator
Lyn Batzer, Student Investigator

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Approval Termination: 30 January 1998

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